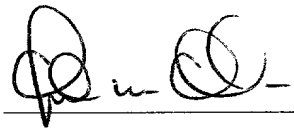


08/612969

US

13 Rec'd PCT/PTO 04 MAR 1996

FORM PTO-1390 (REV 5 93)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			012318-12
U.S. APPLICATION NO. (If known, see 37 CFR 1.5)			
INTERNATIONAL APPLICATION NO. PCT/US94/09827	INTERNATIONAL FILING DATE 31 August 1994	PRIORITY DATE CLAIMED 07 September 1993	
TITLE OF INVENTION INPUT APPARATUS FOR PEOPLE HAVING SMALL HANDS			
APPLICANT(S) FOR DO/EO/US Nusser, Dennis W.			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).</li> <li>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</li> <li>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau.</li> <li>c. <input checked="" type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US)</li> </ol> </li> <li>6. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</li> <li>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input checked="" type="checkbox"/> have been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li> <li>d. <input type="checkbox"/> have not been made and will not be made.</li> </ol> </li> <li>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3))</li> <li>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</li> <li>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</li> </ol>			
Items 11. to 16. below concern other document(s) or information included:			
11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.			
12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included			
13. <input checked="" type="checkbox"/> A <b>FIRST</b> preliminary amendment. <input type="checkbox"/> A <b>SECOND</b> or <b>SUBSEQUENT</b> preliminary amendment.			
14. <input type="checkbox"/> A substitute specification.			
15. <input type="checkbox"/> A change of power of attorney and/or address letter.			
16. <input type="checkbox"/> Other items or information:			

U.S. APPLICATION NO (if known, see 37 CFR 1.5)		INTERNATIONAL APPLICATION NO WO 95/07186		ATTORNEY'S DOCKET NUMBER 12318-12		
17. <input checked="" type="checkbox"/> The following fees are submitted. <b>Basic National Fee (37 CFR 1.492(a)(1)-(5)):</b> Search Report has been prepared by the EPO or JPO..... \$830.00  International preliminary examination fee paid to USPTO (37 CFR 1.482) ..... \$640.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$710.00  Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO..... \$950.00  International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)..... \$90.00  <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>				CALCULATIONS		PTO USE ONLY
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$		
Claims	Number Filed	Number Extra	Rate			
Total Claims	9 - 20 =	0	X \$22.00	\$		
Independent Claims	1 - 3 =	0	X \$74.00	\$		
Multiple dependent claims(s) (if applicable)				+ \$230.00	\$	
<b>TOTAL OF ABOVE CALCULATIONS</b>				= \$		
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).				\$ (320.00)		
<b>SUBTOTAL</b>				= \$ 320.00		
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				+	\$	
<b>TOTAL NATIONAL FEE</b>				= \$ 320.00		
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +				\$		
<b>TOTAL FEES ENCLOSED</b>				= \$ 320.00		
				Amount to be:		
				refunded \$		
				charged \$		
a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>320.00</u> to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>16-1435</u> . A duplicate copy of this sheet is enclosed.						
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.						
SEND ALL CORRESPONDENCE TO Charles W. Calkins Petree Stockton, L.L.P. 1001 West Fourth Street Winston-Salem, NC 27101				<div style="text-align: center;">             SIGNATURE         </div> <div style="text-align: center;"> <u>Charles W. Calkins</u>            NAME         </div> <div style="text-align: center;"> <u>31,814</u>            REGISTRATION NUMBER         </div>		

**13 Rec'd PCT/PTO 04 MAR 1996**

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Nusser, Dennis W.  
Ser. No. : Unassigned (U.S. National Phase of PCT/US 94/07186)  
Filing Date : Filed Herewith  
For : Input Apparatus For People Having Small Hands

HONORABLE COMMISSIONER OF PATENTS  
AND TRADEMARKS  
Washington, DC 20231

**PRELIMINARY AMENDMENT**

Sir:

Prior to calculating the fee due, please amend the above-identified application (filed herewith) as follows:

## IN THE SPECIFICATION:

On page 1, after the Title, please insert:

-- This application is a continuation-in-part of U.S. Patent application serial number 08/378,946, filed January 26, 1995, <sup>now U.S. Patent 5,531,529</sup> which is a continuation of U.S. Patent application serial number 08/117,418, filed September 7, 1993, now abandoned.--

## IN THE CLAIMS:

Please amend claims 3-9 as follows:

Claim 3, line 1, delete "or 2".

Claim 4, line 1, rewrite "claims" as -- claim --, and delete "to 3".

Claim 4, line 1, rewrite "claims" as -- claim --, and delete "to 3".

Claim 5, line 1, rewrite "claims" as -- claim --, and delete "to 4".

Claim 6, line 1, rewrite "claims" as -- claim --, and delete "to 5".

Claim 7, line 1, rewrite "claims" as -- claim --, and delete "to 6".

Claim 8, line 1, rewrite "claims" as -- claim --, and delete "to 7".

Claim 9, line 1, rewrite "claims" as -- claim --, and delete "to 8".

REMARKS

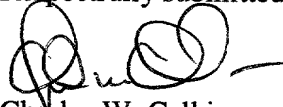
Claims 1-9 are pending in the application.

Applicant has amended the Specification to refer to applications from which the present application claims priority under 35 U.S.C. § 120.

Applicant has amended claims 3-9 to remove the multiple dependencies.

The Examiner is invited to contact the undersigned if there are any questions.

Respectfully submitted,



Charles W. Calkins  
Reg. No. 31,814

March 5, 1996

Petree Stockton, LLP  
1001 W. Fourth Street  
Winston-Salem, North Carolina 27101  
(910) 607-7300

ing, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Dennis W. Nusser

Name of inventor

Dennis W. Nusser

Signature of Inventor

Date

3/2/96

Name of inventor

Date

Signature of Inventor

Name of inventor

Date

Signature of Inventor

00613060-020000

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INPUT APPARATUS FOR PEOPLE HAVING SMALL HANDSBackground -- Field Of The Invention

5 This invention relates to input apparatus, such as a  
keyboard, which can be used for computer, typewriter, and other  
similar applications. It is particularly useful where the user  
is a non-adult (child) or an adult with smaller than adult-sized  
hands. The input apparatus of the present invention provides  
fixed keys with a key spacing, smaller than the ANSI/HFS 100-  
1988 standard spacing, which advantageously permits children as  
young as 3 and 4 years old to use the input apparatus utilizing  
10 standard touch typing techniques. Thus, the present invention  
relates to input apparatus and a method for using them and more  
particularly to a keyboard input device that is scaled to the  
size of the hands of non-adults (children) and adults having  
small hands.

Background -- Description Of Prior Art

15 Previous input apparatus such as computer keyboards and  
typewriters utilize a specific key spacing and character layout  
that have evolved into standards. Character refers to the  
20 character generated by the computer, typewriter or other  
machine, upon receiving a signal that a particular key has been  
depressed or otherwise engaged.

The original "qwerty" key arrangement is the current accepted standard for keyboard character locations. A standard english language "qwerty" keyboard has three rows comprising alphabetic characters and punctuation marks. The remaining rows include numbers and a space bar. A return key, shift keys, a tab key and other command type keys may be included at the ends of each row.

Generally input apparatus such as computer keyboards have the following "qwerty" arrangement with individual rows and columns of keys offset with respect to one another:

`	1	2	3	4	5	6	7	8	9	0	-	=	del
tab	q	w	e	r	t	y	u	i	o	p	[	]	\
cap	a	s	d	f	g	h	j	k	l	;	'	return	
shift		z	x	c	v	b	n	m	,	.	/	shift	
con	opt	alt	space bar									alt	opt con

cap = caps lock; con = control; alt = alt; opt = optional

Holding down the shift key will add the following alphanumeric characters and punctuation marks:

~	!	@	#	\$	%	^	&	*	(	)	_	+	del
tab	Q	W	E	R	T	Y	U	I	O	P	{	}	
cap	A	S	D	F	G	H	J	K	L	:	"	return	
shift		Z	X	C	V	B	N	M	<	>	?	shift	
con	opt	alt	space bar									alt	opt con

cap = caps lock; con = control; alt = alt; opt = optional

Function keys, arrow keys, and/or a separate numeric keypad may be added on the top and or side of this layout. In addition, different computer manufacturers may include additional keys for controlling the operation of their particular computers.

In addition to the "qwerty" keyboard layout, other letter layouts such as the Dvorak keyboard have been developed. As will be recognized by those of ordinary skill in the art from the following descriptions of the present invention, the present invention may comprise any character key layout, such as the qwerty character layout, the Dvorak character layout and the like. Moreover, the present invention may be utilized with character layouts other than the standard English language characters. Thus, it should be understood that the present invention is not limited to a particular arrangement of characters corresponding to each key.

Keyboard standards as to key size and spacing were published February 4, 1988 as American National Standards Institute (ANSI)/Human Factors Society (HFS) Standard No. 100-1988 (hereinafter the "ANSI/HFS 100-1988 standard"). The purpose of this standard is stated as: "This is a technical standard that specifies conditions that have been established as representing acceptable implementation of human factors engineering principles and practices in the design of visual display terminals (VDTs), associated furniture, and the office environment in which they are placed. Human factors engineering principles and practices are highly application dependent. This technical standard is written for those VDT applications described as text processing, data entry, and data inquiry."

The key spacing described in the ANSI/HFS 100-1988 standard is that the center line distance between the horizontal keys shall be between 18 and 19 mm and the center line distance between the vertical keys shall be between 18 and 21 mm. Center line distance is described in the ANSI/HFS 100-1988 standard. Vertical center line distance is the distance between two parallel lines, the first line horizontally bisecting a first key and the second line horizontally bisecting a second adjacent key above or below the first key. Similarly, horizontal center line distance is the distance between two parallel lines, the first line vertically bisecting a first key and the second line vertically bisecting a second adjacent key to the left or right side of the first key. Horizontal and vertical center line



distances may be further understood in view of the following discussions and with reference to the appended figures.

Historically in the art the various inventions of input apparatus are based upon the ANSI/HFS 100-1988 standard which is a result of the evolution of the various input apparatus. It is seen that these various input apparatus are attached to various machines such as typewriters and computers. Historically the input apparatus were designed for the use by adult humans. The training of an individual in the use of these various input apparatus began at the high school level. These high school users were typically 16 years old or older. At this age their hand lengths fall in the 5th percentile of an adult male's hands, meaning they are then suited to using the devices currently provided. The 5th percentile is a size that results from surveying a group of adult males and calculating the frequency in which various sizes occur. The 5th percentile is a number that one would expect 5% of adult males to resemble, on the shorter end of the scale. For example, the 5th percentile of adult males in one study had a hand length of 17.8 cm. The 95th percentile in this study had a hand length of 20.5 cm.

With the advent of the microcomputer there have been an increasing number of children and other than adult scale humans that use various input apparatus. It would be desirable to have an input apparatus which would accommodate their physical sizes, especially their hands in relation to the input apparatus. These users currently in some instances cannot perform routine keystrokes on their input apparatus due to the size and spacing of the keys. For example, a simple, often utilized, command such as control-alternate-delete cannot be easily performed by users with small scaled hands using the devices currently provided.

#### Summary Of The Invention

The present invention overcomes the aforementioned disadvantages and provides input apparatus such as keyboards, that are sized to fit the smaller than adult-dimensioned hands. This invention fills the ergonomic and anthropometric needs of

nonadult students by providing input apparatus scaled to the size of the user's hands.

Studying the hand lengths of youths aged 4 through 16 and comparing these lengths with the 50th percentile lengths of an adult male indicates that at age 4 the children's hands are 61% of the adult, at age six 67.4%, at age eight 74.5% through age sixteen, 93%. These ranges indicate the needs for input devices of varying size.

Accordingly, an embodiment of the input apparatus of the present invention comprises a plurality of keys, sufficient for providing a plurality of input signals to a central processing unit, with a key size and key spacing, centerline to centerline, between 60 and 86% of the ANSI/HFS 100-1988 standard key spacing. This percentage range of the ANSI/HFS 100-1988 standard results in this embodiment of the input apparatus of the present invention having a vertical key spacing of 10.8 to 18.0 millimeters and a horizontal key spacing of 10.8 to 16.4 millimeters. As will be recognized by those of ordinary skill in the art, generally key spacing dictates key size since key spacing is based on centerline distance.

The input apparatus of the present invention may include a plurality of keys sufficient for generating input signals corresponding to each letter of the alphabet. As will be recognized by those of ordinary skill in the art, the generation of input signals corresponding to each letter of the alphabet may be achieved by using a single key for each letter, or, if less than 26 keys are desired, by having a combination of keys which generate a particular letter when engaged together. The individual rows and columns of keys may be offset in order to facilitate the ability of the user of the input apparatus to reach each key. As used herein "offset" refers to the generally utilized method for arranging keys such as disclosed by the ANSI/HFS 100-1988 standard.

Thus, in one embodiment, the input apparatus of the present invention comprises at least 26 keys corresponding to the 26 letters of the english alphabet. For different language alphabets it may be desirable to use a greater or smaller number of keys.

Preferably, the input apparatus of the present invention includes a plurality of keys sufficient for generating input signals corresponding to each letter of the alphabet, and each arabic numeral. Thus, in a preferable embodiment the input apparatus of the present invention comprises at least 36 keys corresponding to the 26 letters of the english alphabet and the ten arabic numerals. Additional, keys may be provided for inputting functions, such as the control and tab keys, found on generally utilized keyboards. Further keys may also be provided for inputting functions such as "home", "page up", "delete", "end", "page down", "up", "down", "left", "right" etc. Still further keys, generally referred to in the art as "function keys" may be included to generate input signals corresponding to particular functions assigned to the key by the operating system or program utilized by the computer receiving input signals from the input apparatus. The input apparatus may also include a key, such as a "shift" key that when depressed in combination with other keys generates uppercase letters or the like. In this manner, the total number of keys utilized in the input apparatus can be minimized if desired.

More preferably, the input apparatus of the present invention comprises at least 58 keys arranged in the standard "qwerty" arrangement described above, and with different functions depending on whether a "shift" key is depressed in combination with another key. This more preferred arrangement may additionally include a plurality of function keys located above or to the side of the alphanumeric keys, and/or function keys, arrow keys and a numeric keypad to the side, or above, the alphanumeric keys.

In one more preferred embodiment, the input apparatus of the present invention comprises at least 58 keys arranged in a manner similar to the following layout, and with the key spacing described above: (the rows and columns would be offset with respect to each other as described above and as shown in the appended figures)

es	F	F	F	F	F	F	F	F	F	F	F	F										
c	1	2	3	4	5	6	7	8	9	10	11	12										
`	1	2	3	4	5	6	7	8	9	0	-	=	de		c	=	/	*				
ta	Q	W	E	R	T	Y	U	I	O	P	[	]	\		7	8	9	-				
ca	A	S	D	F	G	H	J	K	L	;	'	ret	4		5	6	+					
shift	Z	X	C	V	B	N	M	,	.	/	shift	1	2		3	en						
cont		al	space bar							al		cont	0		.							

F1 - F12 = function keys; esc = escape key; de = delete key;

c = clear key; ta = tab key; ca = caps lock key;

cont = control key; al = alt key

Additional arrow keys (for input cursor control signals) and function keys may be located between the alphabet keys and the numeric keypad. Input apparatus designed for use in environments where a language other than English is utilized would have alphanumeric keys appropriate for the desired language.

As will be recognized by those in the art, it may be desirable to separate the function keys and/or numeric keypad, from the alphanumeric and punctuation keys by including areas on the surface of the input apparatus that do not contain keys.

The prior art addresses the application of input apparatus for adults with normal adult male hand sizes in the adult work environment. My invention is the first to suggest a fixed size input apparatus designed specifically for children, and others with smaller than adult scale hands, that are currently being accommodated with the existing prior art.

The ergonomic and anthropometric advantages to my invention apparently are not obvious to those skilled in the art since the input apparatus known as a fixed key computer keyboard exists only in the scale intended for useage by adults with normal adult male hand sizes. The same applies to typewriter keyboards and other input apparatus. The invention of microcomputers resulted in the introduction of adult sized input apparatus to children and users with smaller than normal adult male hands.

Touch typing is now being taught in the third grade of elementary schools. Input apparatus, such as those of the present invention, designed for the scale of these and other non-adult students, and users, are beneficial in allowing the users to be properly accommodated and therefore increase learning ability and keyboard proficiency. It is preferred that the input apparatus of the present invention include sufficient keys to enable input signals to be generated corresponding to each letter of the English language alphabet utilizing standard touch typing techniques. Thus, the present invention also includes a method for teaching touch typing to humans with smaller than normal adult male hands utilizing standard techniques wherein the improvement comprises utilizing an input apparatus with the horizontal and vertical key spacing of the present invention.

In addition to the foregoing advantages, the use of a properly proportioned keyboard by children, and others with smaller than adult scale hands, will help these users avoid potential repetitive strain problems that might arise from using an improperly sized input apparatus.

The invention may be utilized in conjunction with a computing system comprised of a central processing unit, a visual display terminal, and a keyboard. This system can be comprised of separate elements or all elements within the same enclosure.

#### Brief Description Of The Figures

Fig. 1 shows a view of a fixed key input apparatus.

Fig. 2 shows an example of a fixed key input apparatus of the present invention.

#### Detailed Description Of The Invention.

An embodiment of the present invention is shown in Fig. 1. With reference to Fig. 1, the centerline horizontal distance of the keys is 20. 20 can be 10.8 mm to 16.4 mm (0.425 inch and 0.646 inch). Preferable distances are 12.0 mm, 13.5 mm, and 14.5 mm for three different sizes based upon age and hand

length. Other preferable distances are 12.75 mm and 14.15 mm for two different sizes based upon age and hand length.

The centerline vertical distance of the keys is 22. 22 can be 10.8 mm to 18.0 mm (0.425 inch and 0.711 inch). Preferable distances are 12.7 mm., 14.3 mm, and 15.6 mm for three different sizes based upon age and hand length. Other preferable distances are 13.45 mm and 14.9 mm for two different sizes based upon age and hand length.

Spacing for three different sizes is 65%, 73%, and 80% of the average spacing size used in the art, generally the ANSI/HFS 100-1988 standard. Spacing for two different sizes is 69% and 76.5% of the average spacing size used in the art (the ANSI/HFS 100-1988 standard).

The width of an individual key surface is 24. 24 can be 7.2 mm to 13 mm. Preferable distances are those that correspond to the percentage range selected for 20 and 22. Thus, preferable key surface widths are 7.8 mm, 8.76 mm and 9.6 mm (65%, 73% and 80% of the ANSI/HFS 100-1988 standard). Additional preferable key surface widths are 8.28 mm and 9.28 mm (69% and 76.5% of the ANSI/HFS 100-1988 standard).

The depth of an individual key surface is 26. 26 can be 7.2 mm to 15 mm. Preferable distances are those that match the range selected for 20 and 22. Thus, preferable key surface depths are 9.3 mm, 10.44 mm and 11.44 mm (65%, 73% and 80% of a conventional keyboard). Additional preferable key surface depths are 9.87 mm and 10.94 mm (69% and 76.5% of the ANSI/HFS 100-1988 standard).

As will be seen in the art, most input apparatus can include keys sized differently than 24 and 26, including function keys, keypad keys, space bars, numeric keypads and the like. In the input apparatus of the present invention, such keys, if present, will be ergonomically sized and spaced in a manner similar to the standard alphanumeric input keys. Thus, function keys, keypad keys, space bars, numeric keypads and the like would be located at a spacing generally corresponding to 60 to 86% of the ANSI/HFS 100-1988 standard. Preferably these keys would be located at a spacing from the alphanumeric keys corresponding to 65%, 73% and 80% of the ANSI/HFS 100-1988

standard. Additional preferable spacing would locate these keys at a spacing from the alphanumeric keys corresponding to 69% and 76.5% of the ANSI/HFS 100-1988 standard.

As will be recognized by those of skill in the art, other key spacing and key sizes within the ranges and other keyboard configurations fall within the scope of the present invention. As will be obvious to those skilled in the art the present invention may be applied to typewriters and input apparatus other than those designed for use with a computer.

The keyboard may be produced by any technology known to the art such as the technology disclosed in U.S. Patent Numbers 5,067,834, 5,122,786, 4,669,903 and 4,661,005, the disclosures of which are hereby incorporated by reference, and other conventional technologies known to those skilled in the art. As will be obvious to those skilled in the art the present invention may be constructed as a keyboard comprised of the individual keys connecting to an electric or electronic matrix with a source of current allowing inputting electrical signals to a computer or other device.

The ANSI/HFS 100-1988 standard regarding other aspects of the keyboard, such as key force, keying feedback and keystroke travel may be utilized. For example, the conventional keystroke travel set forth in the ANSI/HFS 100-1988 standard, i.e 1.5 - 6 mm, preferably 2-4 mm. This keystroke travel distance can be used but it is preferred that the same 60% to 86% reduction used for key spacing also be used for keystroke travel. Thus the preferred keystroke travel distance for the input apparatus of the present invention is 1.2 - 3.44 mm. With different input apparatus sizes available the user can progress from small to larger with growth.

While the above description contains many specificities, the reader should not, construe these as limitation on the scope of the invention, but merely as exemplifications of preferred embodiments thereof. Those skilled in the art will envision many other possible variations within its scope. For example, skilled artisans have developed other keyboard types to address ergonomic needs of keyboard users by dividing the keyboard in half, changing the angle of the keys, etc. This invention is

equally applicable to other adult-sized input apparatus in the art.

An embodiment of the input apparatus of the present invention is described in the following example:

Example:

A keyboard with the keys arranged in the manner known in the art as the "qwerty" key arrangement embodying in addition a row of 12 function keys arrayed horizontally directly above the horizontal numeric keys, a "10-key" keypad located to the right of the "qwerty" layout, cursor control keys, and various other keys as used in the art of a computer keyboard, the size and space of which is 73% of the keyboard described in the ANSI/HFS 100-1988 standard. The overall footprint of the keyboard is 36 cm wide by 15 cm in depth. The horizontal centerline key spacing, 20, is 13.5 mm. The vertical centerline key spacing, 22, is 14.235 mm. The key tops are, 24, 9 mm wide and, 26, 10 mm deep. The other keys are similarly scaled. The keyboard utilizes present art to provide a current response to the depression of each key or a combination of keys that is utilized by a central processing unit of a microcomputer, allowing the computer to display the information on a visual display unit.



Claims:

- Sub B1
- 1 1. Fixed key input apparatus comprising a plurality of keys  
2 to generate input signals corresponding to each letter of the  
3 alphabet wherein the keys are arranged with a horizontal key  
4 spacing, centerline to centerline, of 10.8 to 16.4  
5 millimeters and a vertical key spacing, centerline to  
6 centerline of 10.8 to 18.0 millimeters.
- 1 2. The input apparatus of claim 1 wherein the alphabet is  
2 English and the input apparatus comprises at least 26 keys.
- 1 3. The input apparatus of claim 1 ~~or 2~~ further comprising  
2 keys to generate input signals corresponding to each numeral.
- 1 4. The input apparatus of <sup>claim</sup> ~~claims 1 to 3~~ wherein the  
2 numerals are arabic numerals and the input apparatus  
3 comprises at least 36 keys.
- 1 5. The input apparatus of <sup>claim</sup> ~~claims 1 to 4~~ further comprising  
2 keys for generating signals corresponding to a function to be  
3 undertaken.
- 1 6. The input apparatus of <sup>claim</sup> ~~claims 1 to 5~~ wherein the  
2 function to be undertaken is selected from the group  
3 consisting of: shift, return, control, alt, tab, caps lock,  
4 home, end, page up, page down, clear, scroll lock and  
5 combinations thereof.
- 1 7. The input apparatus of <sup>claim</sup> ~~claims 1 to 6~~ wherein the  
2 individual key width is 7.2 mm to 13 mm.
- 1 8. The input apparatus of <sup>claim</sup> ~~claims 1 to 7~~ wherein the  
2 individual key depth is 7.2 mm to 15 mm.
- 1 9. The input apparatus of <sup>claim</sup> ~~claims 1 to 8~~ wherein the  
2 individual keys are arranged in a qwerty layout.
- 00613060-05001580

PCT

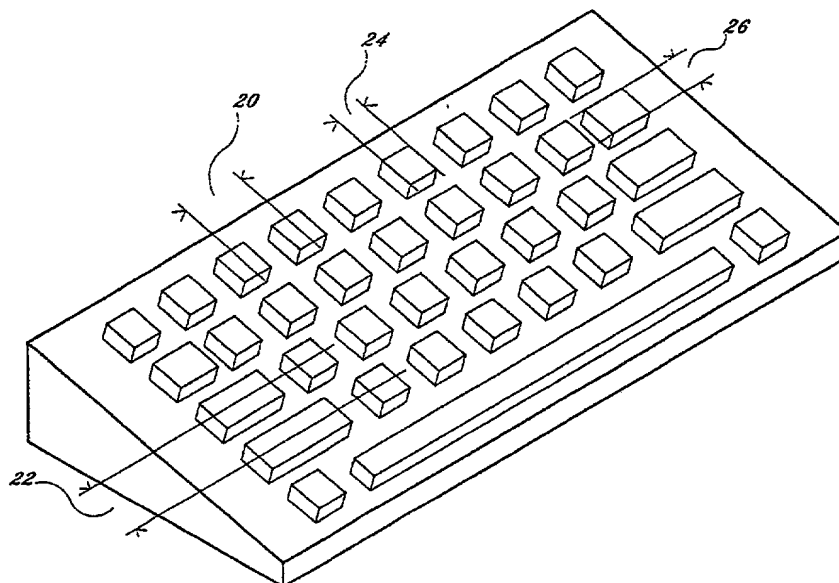
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US94/09827 <b>(22) International Filing Date:</b> 31 August 1994 (31.08.94) <b>(30) Priority Data:</b> 08/117,418 7 September 1993 (07.09.93) US <b>(71)(72) Applicant and Inventor:</b> NUSSER, Dennis, W. [US/US]; 512 Victoria Terrace, Fort Lauderdale, FL 33301 (US). <b>(74) Agent:</b> CALKINS, Charles, W.; Petree Stockton, L.L.P., 1001 West Fourth Street, Winston-Salem, NC 27101 (US).		<b>(81) Designated States:</b> AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD).  <b>Published</b> <i>With international search report.</i>

**(54) Title:** INPUT APPARATUS FOR PEOPLE HAVING SMALL HANDS



**(57) Abstract**

Input apparatus scaled for non-adult humans and adult humans having small hands. The input apparatus are especially well suited for use as computer keyboards for use by schoolchildren. Also disclosed is a computing system including the input apparatus.

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O.G. FIG.	
CLASS	SUBCLASS
BY CRAFTSMAN	

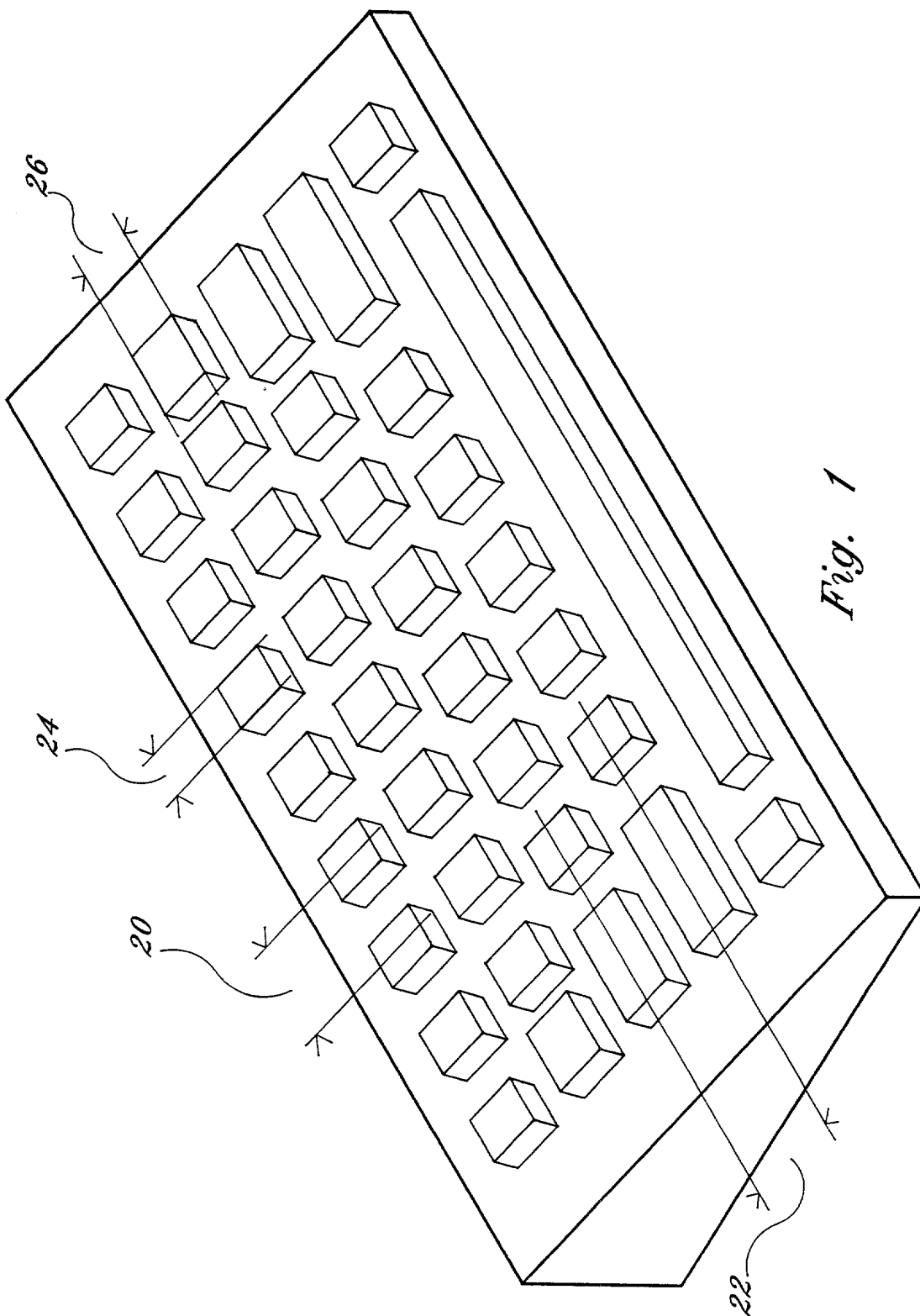


Fig. 1

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[illegible]

Fig. 2

APPROVED	O.C. FIG.	
BY	CLASS	SUBCLASS
DATE		
DRAFTSMAN		

[illegible]

<b>Combined Declaration For Patent Application and Power of Attorney (Continued)</b> (Includes Reference to PCT International Applications)			ATTORNEY'S DOCKET NUMBER <b>12318-12</b>		
<p>I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:</p>					
<b>PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120</b>					
U.S. APPLICATIONS			STATUS (Check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED	
08/117,418	07 September 1993			X	
08/378,946	26 January 1985		X		
<b>PCT APPLICATIONS DESIGNATING THE U.S.</b>					
PCT APPLICATION NO	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)			
<p><b>POWER OF ATTORNEY:</b> As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration number)</p> <p style="margin-left: 40px;">Charles W. Calkins <u>31,814</u></p> <p style="margin-left: 40px;">John M. Harrington <u>25,592</u> <span style="margin-left: 20px;">2</span></p>					
<b>Send Correspondence to:</b> <u>Charles W. Calkins</u> <u>Petree Stockton L.L.P.</u> <u>1001 West Fourth Street</u> <u>Winston-Salem, North Carolina 27101</u>			<b>Direct Telephone Calls to:</b> <small>(name and telephone number)</small> <u>Charles W. Calkins</u> <u>910 607 7315</u>		
201	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME	
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP	
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY	
		Nusser	Dennis	W	
		Ft. Lauderdale	Florida	US	
		512 Victoria Terrace	Ft. Lauderdale	FL 33301	
202	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME	
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP	
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY	
203	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME	
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP	
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<p>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.</p>					
SIGNATURE OF INVENTOR 201		SIGNATURE OF INVENTOR 202		SIGNATURE OF INVENTOR 203	
DATE		DATE		DATE	
2 MARCH 1996					

**COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY**  
(Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER

12318-12

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

INPUT APPARATUS FOR PEOPLE HAVING SMALL HANDS

the specification of which (check only one item below):

☐ is attached hereto.

☐ was filed as United States application

Serial No. \_\_\_\_\_

on \_\_\_\_\_

and was amended

on \_\_\_\_\_ (if applicable).

☒ was filed as PCT international application

Number PCT/US 94/09827

on 31 AUGUST 1994

and was amended under PCT Article 19

on 07 JULY 1995 (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

**PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:**

COUNTRY (if PCT indicate PCT)	APPLICATION NUMBER	DATE OF FILING (day month year)	PRIORITY CLAIMED UNDER 35 USC 119
US	94/09827	31 AUGUST 1994	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

## PATENT

Attorney's Docket No. 012318-12Applicant or Patentee: Dennis W. NusserSerial or Patent No.: 08 / 117,418Filed or Issued: September 7, 1993For: INPUT APPARATUS FOR PEOPLE HAVING SMALL HANDS**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY  
STATUS (37 CFR 1.9(f) and 1.27(b))—INDEPENDENT INVENTOR**

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled INPUT APPARATUS FOR PEOPLE HAVING SMALL HANDS described in

- ☒ the specification filed herewith. (Filing Under 35 U.S.C. 371 of PCT/US94/09827)  
☐ application serial no. 0 / \_\_\_\_\_, filed \_\_\_\_\_.  
☐ patent no. \_\_\_\_\_, issued \_\_\_\_\_.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

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- ☒ no such person, concern, or organization  
☐ persons, concerns or organizations listed below\*

\*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention availing to their status as small entities. (37 CFR 1.27).

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ADDRESS \_\_\_\_\_

- ☐ INDIVIDUAL      ☐ SMALL BUSINESS CONCERN      ☐ NONPROFIT ORGANIZATION

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

- ☐ INDIVIDUAL      ☐ SMALL BUSINESS CONCERN      ☐ NONPROFIT ORGANIZATION

FULL NAME \_\_\_\_\_

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I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of pay-